

COVID Vaccine and Allergy

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Safe and Impactful COVID Vaccine Administration

- Proper Screening
- Monitoring
- Clinical Assessment

**Allergic Reactions Including Anaphylaxis After Receipt of the First Dose of
Pfizer-BioNTech COVID-19 Vaccine — United States, December 14–23, 2020**

- Vaccine Adverse Event Reporting System (VAERS) detected 21 cases of anaphylaxis after administration of a reported 1,893,360 first doses of the Pfizer-BioNTech COVID-19 vaccine
- 11.1 cases per million doses (0.001%)
 - 1.3 cases per million for flu vaccines
- 71% occurred within 15 min of vaccination, 86% within 30 minutes
 - Range = 2–150 minutes
- Of 20 with follow-up info, all had recovered or been discharged home.

TABLE 1. Characteristics of reported cases of anaphylaxis (n = 21) after receipt of Pfizer-BioNTech COVID-19 vaccine — Vaccine Adverse Events Reporting System (VAERS), United States, December 14–23, 2020

Age (yrs)	Sex	Past history		Onset after receipt (mins)	Signs and symptoms	Treatment setting [†]	Epi received	Brighton level [§]	Outcome or disposition [¶]
		Allergies or allergic reactions*	Anaphylaxis						
27	F	Tropical fruit	No	2	Diffuse erythematous rash, sensation of throat closure	ED	Yes	2	Recovered at time of report
35	M	No	No	5	Diffuse erythematous rash, swollen tongue	ED	Yes	1	Discharged home
55	F	Rabies vaccine	Yes, rabies vaccine	5	Generalized urticaria, wheezing	Inpatient	Yes	1	Discharged home
52	F	Sulfa drugs	Yes, sulfa drugs	7	Wheezing, stridor, nausea	Inpatient	Yes	1	Discharged home
30	F	Bee sting	No	8	Generalized urticaria, wheezing	Inpatient	Yes	1	Recovered at time of report
32	F	No	No	10	Diffuse erythematous rash, difficulty breathing	Inpatient	Yes	2	Discharged home
60	F	Eggs, milk, sulfa drugs, jellyfish sting	Yes, jellyfish sting	10	Diffuse erythematous rash, hoarseness	ED	Yes	2	Recovered at time of report
29	F	Shellfish, eggs	No	10	Generalized urticaria, swollen lips and tongue	ED	Yes	1	Discharged home
52	F	Metoprolol, clarithromycin	No	10	Generalized urticaria, stridor, wheezing	ED	Yes	1	Recovered at time of report
49	F	Iodinated contrast media	No	13	Generalized urticaria, swollen throat	ED	Yes	1	Recovered at time of report
36	F	No	No	13	Generalized urticaria, nausea	ED	Yes	2	Not specified
40	F	Sulfa drugs, walnuts	Yes, walnuts	14	Generalized urticaria, nausea	ED	Yes	2	Discharged home
33	F	Wasp sting	No	15	Diffuse erythematous rash, swollen lip	ED	Yes	1	Recovered at time of report
41	F	Prochlorperazine	Yes, prochlorperazine	15	Diffuse erythematous rash, persistent dry cough	ED	No	2	Discharged home
57	F	Penicillin, azithromycin	Yes, unspecified	15	Diffuse pruritic rash, hoarseness	ED	Yes	2	Recovered at time of report
45	M	No	No	23	Generalized urticaria, swollen airway	ED	Yes	2	Discharged home
46	F	Hydrocodone, nuts	No	25	Diffuse erythematous rash, difficulty swallowing	ED	Yes	2	Discharged home
30	F	Cats, dogs	No	30	Generalized pruritis, wheezing	ED	No	2	Discharged home
44	F	Influenza A(H1N1) vaccine	Yes, influenza A(H1N1) vaccine	34	Generalized urticaria, swollen lips	ED	Yes	1	Discharged home
29	F	Sulfa drugs	No	54	Generalized urticaria, persistent cough	ED	Yes	2	Recovered at time of report
29	F	Steroids	No	150	Diffuse pruritic rash, swollen lip	ED	Yes	1	Discharged home

- 17 (81%) with h/o allergies to food, vaccine, medication, venom, contrast, or pets.
- 4 with no h/o any allergies
- 7 with h/o anaphylaxis
 - Rabies vaccine
 - Flu vaccine
- 19 (90%) diffuse rash or generalized hives

Allergic Reactions Including Anaphylaxis After Receipt of the First Dose of Pfizer-BioNTech COVID-19 Vaccine — United States, December 14–23, 2020. MMWR Morb Mortal Wkly Rep 2021;70:46–51.

Early Signs of Anaphylaxis

- Respiratory: sensation of throat closing*, stridor, shortness of breath, wheeze, cough
- Gastrointestinal: nausea*, vomiting, diarrhea, abdominal pain
- Cardiovascular: dizziness*, fainting, tachycardia, hypotension
- Skin/mucosal: generalized hives, itching, or swelling of lips, face, throat

*these can be subjective and overlap with anxiety or vasovagal syndrome

Labs that can help assess for anaphylaxis

- Tryptase, serum (red top tube)
- C5b-9 terminal complement complex Level, serum (SC5B9) (lavender top EDTA tube)

Characteristic	Immediate allergic reactions (including anaphylaxis)	Vasovagal reaction	Vaccine side effects (local and systemic)
Timing after vaccination	Most occur within 15-30 minutes of vaccination	Most occur within 15 minutes	Median of 1 to 3 days after vaccination (with most occurring day after vaccination)
Signs and symptoms			
Constitutional	Feeling of impending doom	Feeling warm or cold	Fever, chills, fatigue
Cutaneous	Skin symptoms present in ~90% of people with anaphylaxis, including pruritus, urticaria, flushing, angioedema	Pallor, diaphoresis, clammy skin, sensation of facial warmth	Pain, erythema or swelling at injection site, lymphadenopathy in same arm as vaccination
Neurologic	Confusion, disorientation, dizziness, lightheadedness, weakness, loss of consciousness	Dizziness, lightheadedness, syncope (often after prodromal symptoms for a few seconds or minutes), weakness, changes in vision (such as spots of flickering lights, tunnel vision), changes in hearing	Headache
Respiratory	Shortness of breath, wheezing, bronchospasm, stridor, hypoxia	Variable; if accompanied by anxiety, may have an elevated respiratory rate	N/A
Cardiovascular	Hypotension, tachycardia	Variable; may have hypotension or bradycardia during syncopal event	N/A
Gastrointestinal	Nausea, vomiting, abdominal cramps, diarrhea	Nausea, vomiting	Vomiting or diarrhea may occur
Musculoskeletal	N/A	N/A	Myalgia, arthralgia
Vaccine recommendations			
Recommended to receive second dose of mRNA COVID-19 vaccine?	No	Yes	Yes

Emergency Supplies

The following emergency equipment should be immediately available to the clinical team assessing and managing anaphylaxis.

Should be available at all sites	If feasible, include at sites (not required)
Epinephrine prefilled syringe or autoinjector*	Pulse oximeter
H1 antihistamine (e.g., diphenhydramine)†	Oxygen
Blood pressure cuff	Bronchodilator (e.g., albuterol)
Stethoscope	H2 antihistamine (e.g., famotidine, cimetidine)
Timing device to assess pulse	Intravenous fluids
	Intubation kit
	Adult-sized pocket mask with one-way valve (also known as cardiopulmonary resuscitation (CPR) mask)

*COVID-19 vaccination sites should have at least 3 doses of epinephrine on hand at any given time.

†Antihistamines may be given as adjunctive treatment but should not be used as initial or sole treatment for anaphylaxis. Additionally, caution should be used if oral medications are administered to persons with impending airway obstruction.

Management of anaphylaxis at a COVID-19 vaccination site

- If anaphylaxis is suspected, take the following steps:
- Rapidly assess airway, breathing, circulation, and mentation (mental activity).
- Call for emergency medical services.
- Place the patient in a supine position (face up), with feet elevated, unless upper airway obstruction is present or the patient is vomiting.
- Epinephrine (1 mg/ml aqueous solution [1:1000 dilution]) is the first-line treatment for anaphylaxis and should be administered immediately.
 - In adults, administer a 0.3 mg intramuscular dose using a premeasured or prefilled syringe, or an autoinjector in the mid-outer thigh.
 - The maximum adult dose is 0.5 mg per dose.
 - Epinephrine dose may be repeated every 5-15 minutes (or more often) as needed to control symptoms while waiting for emergency medical services.
 - Because of the acute, life-threatening nature of anaphylaxis, there are no contraindications to epinephrine administration.
- Antihistamines (e.g., H1 or H2 antihistamines) and bronchodilators do not treat airway obstruction or hypotension, and thus are not first-line treatments for anaphylaxis. However, they can help provide relief for hives and itching (antihistamines) or symptoms of respiratory distress (bronchodilators) but should only be administered after epinephrine in a patient with anaphylaxis. Because anaphylaxis may recur after patients begin to recover, monitoring in a medical facility for at least several hours is advised, even after complete resolution of symptoms and signs.

Ingredients* included in mRNA COVID-19 vaccines

Description	Pfizer-BioNTech	Moderna
mRNA	nucleoside-modified mRNA encoding the viral spike (S) glycoprotein of SARS-CoV-2	nucleoside-modified mRNA encoding the viral spike (S) glycoprotein of SARS-CoV-2
Lipids	2[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide	PEG2000-DMG: 1,2-dimyristoyl-rac-glycerol, methoxypolyethylene glycol
	1,2-distearoyl-sn-glycero-3-phosphocholine	1,2-distearoyl-sn-glycero-3-phosphocholine
	cholesterol	cholesterol
	(4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate)	SM-102: heptadecan-9-yl 8-((2-hydroxyethyl) (6-oxo-6-(undecyloxy) hexyl) amino) octanoate
Salts, sugars, buffers	potassium chloride	Tromethamine
	monobasic potassium phosphate	Tromethamine hydrochloride
	sodium chloride	Acetic acid
	dibasic sodium phosphate dihydrate	Sodium acetate
	sucrose	sucrose


*As reported in the prescribing information

Recommended Screening Questions for mRNA COVID Vaccines

1. Have you ever had an allergic reaction to a component of the COVID-19 vaccine, including polyethylene glycol (PEG, which is found in some medications such as laxatives and preparations for colonoscopy procedures), polysorbate, or a previous dose of COVID-19 vaccine? (This would include a severe allergic reaction [e.g., anaphylaxis] that required treatment with epinephrine or EpiPen® or that caused you to go to the hospital. It would also include an allergic reaction that occurred within 4 hours that caused hives, swelling, or respiratory distress, including wheezing.)
2. Have you ever had an allergic reaction to another vaccine (other than COVID-19 vaccine) or an injectable medication?
3. Have you ever had a severe allergic reaction (e.g. anaphylaxis) to something other than a component of COVID-19 vaccine, polysorbate, or any vaccine or injectable medication? This would include food, pet, insect, venom, environmental, latex, or oral medication allergies.

Taken from CDC Pre-Screening

Prevaccination Checklist
for COVID-19 Vaccines

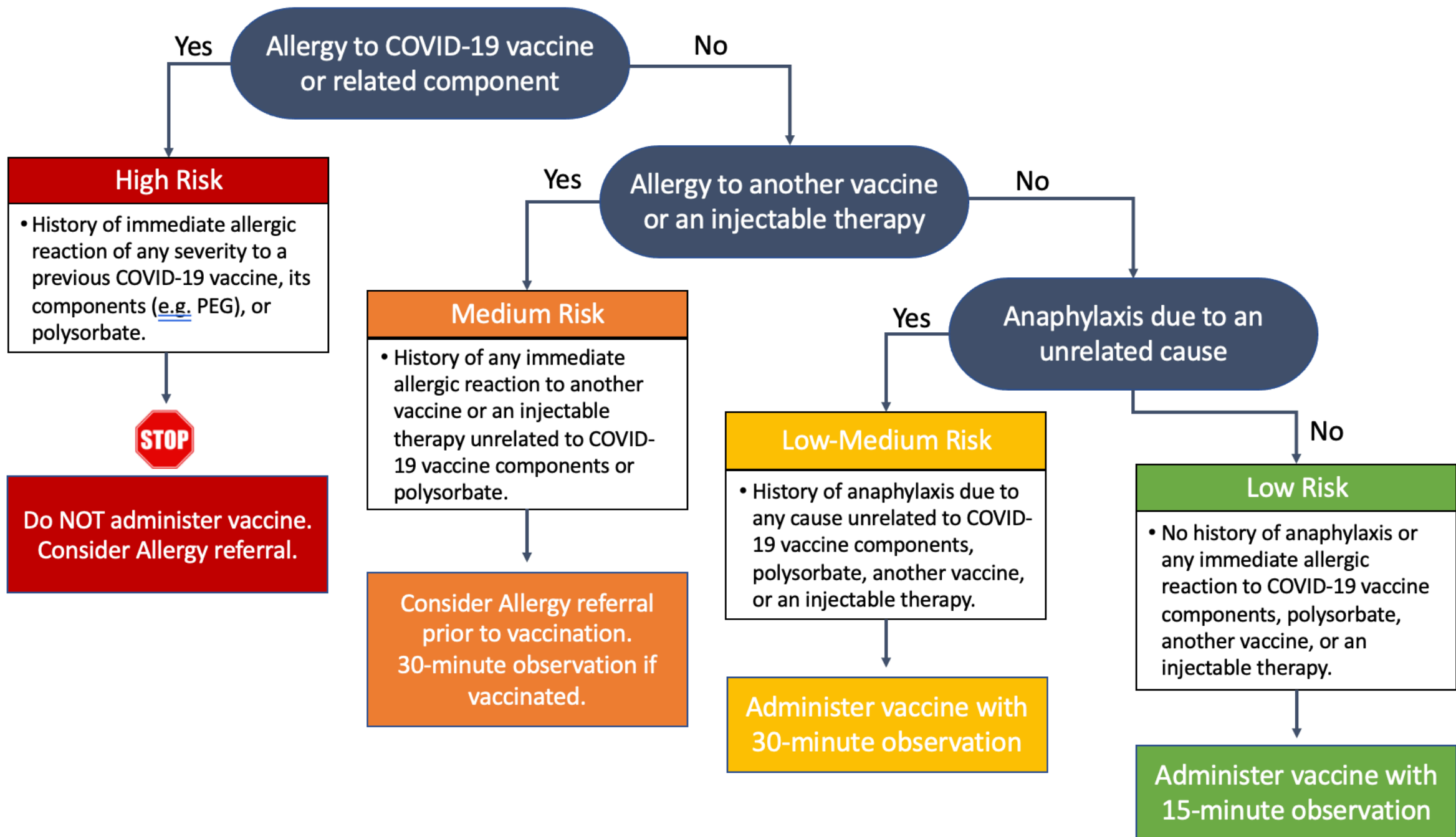


For vaccine recipients:
The following questions will help us determine if there is any reason you should not get the COVID-19 vaccine today.
If you answer “yes” to any question, it does not necessarily mean you should not be vaccinated. It just means additional questions may be asked.
If a question is not clear, please ask your healthcare provider to explain it.

Patient Name _____
Age _____

	Yes	No	Don't know
1. Are you feeling sick today?			
2. Have you ever received a dose of COVID-19 vaccine?			
• If yes, which vaccine product did you receive? <input type="checkbox"/> Pfizer <input type="checkbox"/> Moderna <input type="checkbox"/> Another product _____			
3. Have you ever had an allergic reaction to: (This would include a severe allergic reaction [e.g., anaphylaxis] that required treatment with epinephrine or EpiPen® or that caused you to go to the hospital. It would also include an allergic reaction that occurred within 4 hours that caused hives, swelling, or respiratory distress, including wheezing.)			
• A component of the COVID-19 vaccine, including polyethylene glycol (PEG), which is found in some medications, such as laxatives and preparations for colonoscopy procedures			
• Polysorbate			
• A previous dose of COVID-19 vaccine			
4. Have you ever had an allergic reaction to another vaccine (other than COVID-19 vaccine) or an injectable medication? (This would include a severe allergic reaction [e.g., anaphylaxis] that required treatment with epinephrine or EpiPen® or that caused you to go to the hospital. It would also include an allergic reaction that occurred within 4 hours that caused hives, swelling, or respiratory distress, including wheezing.)			
5. Have you ever had a severe allergic reaction (e.g., anaphylaxis) to something other than a component of COVID-19 vaccine, polysorbate, or any vaccine or injectable medication? This would include food, pet, environmental, or oral medication allergies.			
6. Have you received any vaccine in the last 14 days?			
7. Have you ever had a positive test for COVID-19 or has a doctor ever told you that you had COVID-19?			
8. Have you received passive antibody therapy (monoclonal antibodies or convalescent serum) as treatment for COVID-19?			
9. Do you have a weakened immune system caused by something such as HIV infection or cancer or do you take immunosuppressive drugs or therapies?			
10. Do you have a bleeding disorder or are you taking a blood thinner?			
11. Are you pregnant or breastfeeding?			

Form reviewed by _____ Date _____



Consistent with CDC Summary/Stratification

Summary: Triage of persons presenting for mRNA COVID-19 vaccination

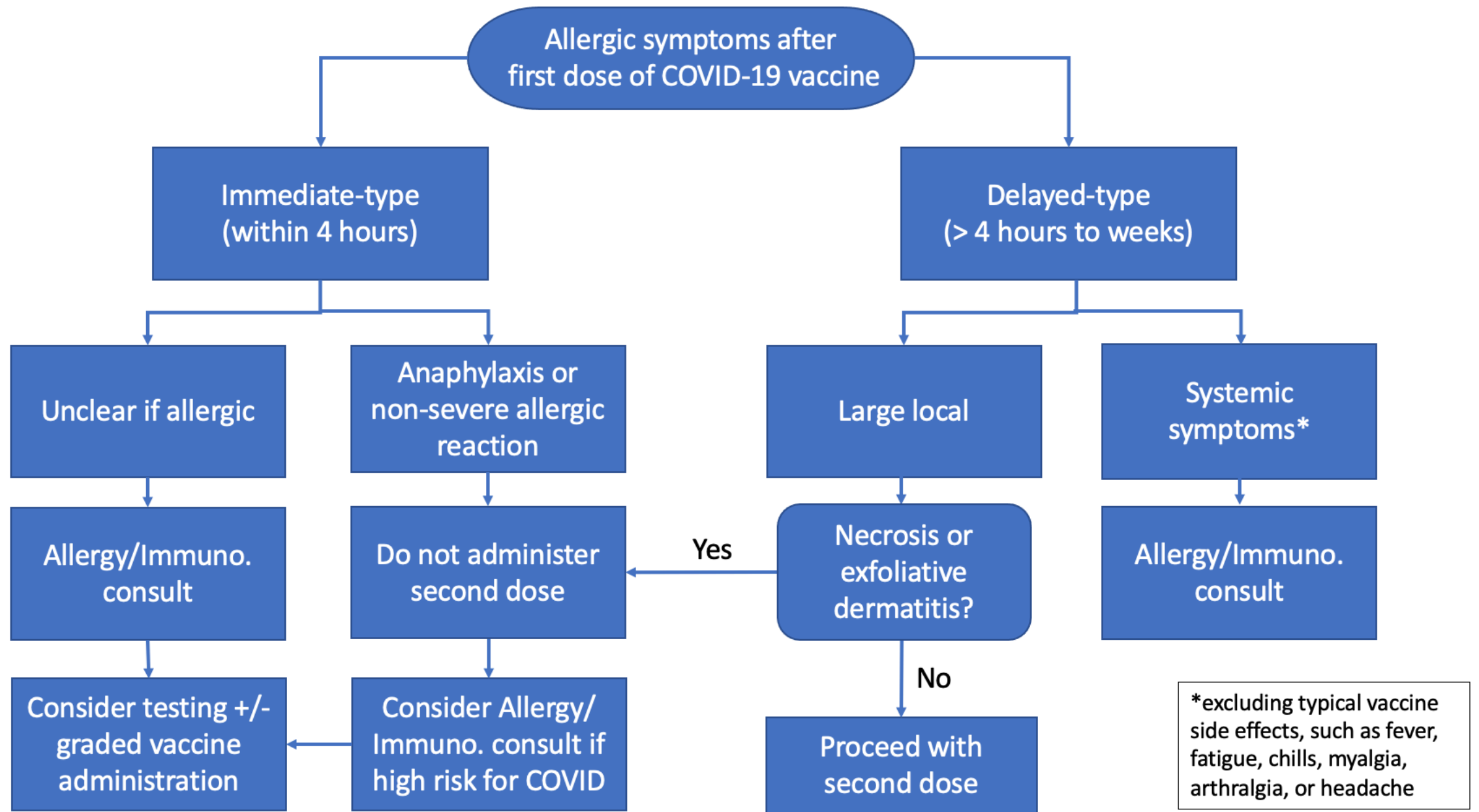
MAY PROCEED WITH VACCINATION	PRECAUTION TO VACCINATION	CONTRAINDICATION TO VACCINATION
<p>ALLERGIES History of allergies that are unrelated to components of an mRNA COVID-19 vaccine†, other vaccines, or injectable therapies, such as:</p> <ul style="list-style-type: none">• Allergy to oral medications (including the oral equivalent of an injectable medication)• History of food, pet, insect, venom, environmental, latex, etc., allergies• Family history of allergies <p>ACTIONS</p> <ul style="list-style-type: none">• 30 minute observation period: Persons with a history of anaphylaxis (due to any cause)• 15 minute observation period: All other persons	<p>ALLERGIES</p> <ul style="list-style-type: none">• History of any immediate allergic reaction‡ to vaccines or injectable therapies (except those related to component of mRNA COVID-19 vaccine† or polysorbate, as these are contraindicated) <p>ACTIONS:</p> <ul style="list-style-type: none">• Risk assessment• Consider deferral of vaccination and/or referral to allergist-immunologist• 30 minute observation period if vaccinated	<p>ALLERGIES History of the following are contraindications to receiving either of the mRNA COVID-19 vaccine†:</p> <ul style="list-style-type: none">• Severe allergic reaction (e.g., anaphylaxis) after a previous dose of an mRNA COVID-19 vaccine or any of its components• Immediate allergic reaction‡ of any severity to a previous dose of an mRNA COVID-19 vaccine or any of its components^ (including polyethylene glycol)^#• Immediate allergic reaction of any severity to polysorbate^# <p>ACTIONS</p> <ul style="list-style-type: none">• Do not vaccinate^#• Consider referral to allergist-immunologist

† Refers only to mRNA COVID-19 vaccines currently authorized in the United States (i.e., Pfizer-BioNTech, Moderna COVID-19 vaccines)

‡ Immediate allergic reaction to a vaccine or medication is defined as any hypersensitivity-related signs or symptoms consistent with urticaria, angioedema, respiratory distress (e.g., wheezing, stridor), or anaphylaxis that occur within four hours following administration.

^ See Appendix A for a list of ingredients. Note: Polyethylene glycol (PEG), an ingredient in both mRNA COVID-19 vaccines, is structurally related to polysorbate and cross-reactive hypersensitivity between these compounds may occur. Information on ingredients of a vaccine or medication (including PEG, a PEG derivative, or polysorbates) can be found in the package insert.

These persons should not receive mRNA COVID-19 vaccination at this time unless they have been evaluated by an allergist-immunologist and it is determined that the person can safely receive the vaccine (e.g., under observation, in a setting with advanced medical care available)



Management of Delayed Large Locals

- Recommend symptomatic treatment: ice/cold compress, analgesics (e.g. ibuprofen, acetaminophen), antihistamines (e.g. diphenhydramine, cetirizine), and topical moderate (e.g. triamcinolone) or high (e.g. fluocinolone) potency steroids
- If symptoms are significant, consider oral prednisone 20-40 mg for 1-2 days. This should involve shared decision-making with the patient due to the theoretical risk that corticosteroids may dampen the immune response to the vaccine.
- Delayed local reactions are often self-limiting conditions that do not contraindicate administration of subsequent doses of the same vaccine. A second dose would not be recommended if there was local necrosis (severe Arthus reaction) or exfoliative dermatitis (i.e. SJS/TEN spectrum).
- Large local vaccine reactions secondary to T-cell infiltration are often associated with prolonged and very effective immunity.

San Diego COVID Vaccine Allergist Group

- UC San Diego/Rady Children's Hospital:
 - Stephanie Leonard, Michael Welch, Susan Laubach, Lori Broderick
- UC San Diego:
 - Marc Reidl, Alexander Kim, Tukisa Smith, Sun-Mi Choi
- Sharp:
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